

1907



Cornell University

SUMMER SESSION.

JULY 4TH TO AUGUST 14TH, 1907.

OFFICERS.

JACOB GOULD SCHURMAN, LL.D.,
President of the University.
GEORGE PRENTICE BRISTOL, A.M.,
Director of the Summer Session.
DAVID FLETCHER HOY, M.S.,
Registrar of the University.

FACULTY.

ISAAC MADISON BENTLEY, Ph.D.,	PSYCHOLOGY
Assistant Professor of Psychology, Cornell University.	
ERNEST BLAKER, Ph.D.,	PHYSICS
Assistant Professor of Physics, Cornell University.	
GEORGE PRENTICE BRISTOL, A.M.,	GREEK
Professor of Greek, Cornell University.	
ARTHUR WESLEY BROWNE, Ph.D.,	CHEMISTRY
Assistant Professor of Chemistry, Cornell University.	
CLINTON BYRON BURKE,	MANUAL TRAINING
Foreman of Woodshop, Cornell University.	
GEORGE LINCOLN BURR, LL.D.,	HISTORY
Professor of Mediæval History, Cornell University.	
WALTER BUCKINGHAM CARVER, Ph.D.,	MATHEMATICS
Instructor in Mathematics, Cornell University.	
GEORGE EVERT CONDRA, Ph.D.	GEOGRAPHY
Professor of Geology, University of Nebraska.	
LANE COOPER, Ph.D.,	ENGLISH
Assistant Professor of English, Cornell University.	
STANLEY COULTER, Ph.D.,	NATURE STUDY
Professor of Biology, Purdue University.	
BLIN SILL CUSHMAN, B.S.,	CHEMISTRY
Instructor in Chemistry, Cornell University.	

LC 5752
N7C7

ARTHUR DAVIS DEAN, B.S.,	MANUAL TRAINING
Special Investigator in Industrial Education, Boston, Mass.	
CHARLES DEGARMO, Ph.D.,	EDUCATION
Professor of Education, Cornell University.	
HERBERT GROVE DORSEY, M.S.,	PHYSICS
Instructor in Physics, Cornell University.	
MELVIN DRESBACH, M.S., M.D.,	PHYSIOLOGY
Instructor in Physiology, Cornell University.	
ELIAS JUDAH DURAND, D.Sc.,	BOTANY
Instructor in Botany, Cornell University.	
CHARLES LOVE DURHAM, Ph.D.,	LATIN
Assistant Professor of Latin, Cornell University.	
CLARENCE ERROL FERREE, M.S.,	PSYCHOLOGY
Assistant in Psychology, Cornell University.	
WILLIAM BENJAMIN FITE, Ph.D.,	MATHEMATICS
Assistant Professor of Mathematics, Cornell University.	
CHARLES WELLINGTON FURLONG,	DRAWING AND DESIGN
Author and Artist, Watertown, Mass.	
PAUL FREDERICK GAEHR, A.M.,	PHYSICS
Instructor in Physics, Cornell University.	
OTIS AMSDEN GAGE, A.M.,	PHYSICS
Instructor in Physics, Cornell University.	
LUDWIG REINHOLD GEISSLER, B.Lit.,	PSYCHOLOGY
Assistant in Psychology, Cornell University.	
ARTHUR GORDON, A.M.,	SPANISH
Instructor in Romance Languages, Cornell University.	
OTHON GOEPP GUERLAC, Licencié ès lettres,	FRENCH
Assistant Professor of Romance Languages, Cornell University.	
WALTER LISTON HEAD,	MANUAL TRAINING
Assistant in Forging, Cornell University.	
JOHN IRWIN HUTCHINSON, Ph.D.,	MATHEMATICS
Assistant Professor of Mathematics, Cornell University.	
OSCAR AUGUSTUS JOHANNSEN, Ph.D.,	MECHANICS
Assistant Professor of Civil Engineering, Cornell University.	
EDWIN WALTER KEMMERER, Ph.D.,	POLITICAL SCIENCE
Assistant Professor of Political Economy, Cornell University.	
DEXTER SIMPSON KIMBALL, A.B.,	MANUAL TRAINING
Professor of Machine Design, Cornell University.	

- BENJAMIN FREEMAN KINGSBURY, Ph.D., PHYSIOLOGY
Assistant Professor of Physiology, Cornell University.
- ALEXANDER DYER MACGILLIVRAY, Ph.D., ENTOMOLOGY
Assistant Professor of Entomology, Cornell University.
- CHARLES ALEXANDER McMURRY, Ph.D., EDUCATION
Principal Penn. State Normal School, California, Pa.
- THEODORE CLARENCE MITCHILL, A.M., ENGLISH
Head of Dept. English, Boys' High School, Brooklyn, N. Y.
- GEORGE SYLVANUS MOLER, B.M.E., PHOTOGRAPHY
Assistant Professor of Physics, Cornell University.
- EVERETT WARD OLMSTED, Ph.D., FRENCH
Assistant Professor of Romance Languages, Cornell University.
- THOMAS WALKER PAGE, Ph.D., ECONOMICS
Professor of Economics, University of Virginia.
- FRITZ PAULS, Ph.D., GERMAN
Instructor in German, Cornell University.
- JAMES E. PEABODY, A.M., BIOLOGY
Head of Dept. Biology, Morris High School, New York City.
- MILES ALBION POND, Ph.B., DESCRIPTIVE GEOMETRY
Instructor in Civil Engineering, Cornell University.
- PAUL RUSSEL POPE, Ph.D., GERMAN
Assistant Professor of German, Cornell University.
- HUGH DANIEL REED, Ph.D., ZOOLOGY
Instructor in Vertebrate Zoology, Cornell University.
- WILLIAM ALBERT RILEY, Ph.D., ENTOMOLOGY
Assistant Professor of Entomology, Cornell University.
- WILLARD WINFIELD ROWLEE, D.Sc., BOTANY
Professor of Botany, Cornell University.
- JOHN SANFORD SHEARER, Ph.D., PHYSICS
Assistant Professor of Physics, Cornell University.
- RALPH EDWARD SHELDON, A.M., ZOOLOGY
Fellow in Zoology, Harvard University.
- FRED FLOYD SHETTERLY, A.B., CHEMISTRY
Assistant in Chemistry, Cornell University.
- RALPH CUTHBERT SNOWDON, A.B., CHEMISTRY
Instructor in Chemistry, Cornell University.
- VIRGIL SNYDER, Ph.D., MATHEMATICS
Assistant Professor of Mathematics, Cornell University.

S. m. 29 IX/16

- CHARLES M. STEBBINS, A.M., ENGLISH
Teacher of English, Boys' High School, Brooklyn, N. Y.
- JOHN HENRY TANNER, Ph. D., MATHEMATICS
Professor of Mathematics, Cornell University.
- RALPH STOCKMAN TARR, B.S., GEOGRAPHY
Professor of Physical Geography, Cornell University.
- HARVEY WATERMAN THAYER, Ph.D., GERMAN
Preceptor in German, Princeton University.
- EDWARD BRADFORD TITCHENER, LL.D., PSYCHOLOGY
Sage Professor of Psychology, Cornell University.
- ROBERT VANDERHOEF, MANUAL TRAINING
Assistant in Foundry, Cornell University.
- CLAUDE HALSTEAD VAN TYNE, Ph.D., HISTORY
Professor of History, University of Michigan.
- ALBERT EDWARD WELLS, MANUAL TRAINING
Superintendent of Shops, Cornell University.
- GUY MONTROSE WHIPPLE, Ph.D., EDUCATION
Assistant Professor of Education, Cornell University.
- RAY HUGHES WHITBECK, A.B., GEOGRAPHY
Supervisor New Jersey State Normal School, Trenton.
- KARL MCKAY WIEGAND, Ph.D., BOTANY
Instructor in Botany, Cornell University.
- JOHN TAMSH WILLIAMS, MANUAL TRAINING
Instructor in Machine Design, Cornell University.
- ALBERT HAZEN WRIGHT, A.M., ZOOLOGY
Assistant in Vertebrate Zoology, Cornell University.

GENERAL STATEMENT.

OBJECT OF THE SUMMER SESSION.

The primary object of the instruction given in the Summer Session is to meet the needs of the following classes :

I. Professors and Teachers in colleges and schools, **superintendents**, and **supervisors** of special branches of instruction.

As the announcements of the different departments show, there is a wide range of work possible. In general, this work is either advanced, and therefore suited for specialists who wish to pursue their individual investigations and study, or is of a more elementary character adapted to teachers who desire to start in a new field. In addition to the instruction of the class room, full opportunity is afforded both of these classes by the ample facilities of the University's libraries, laboratories, and shops, all of which are open for their use. For superintendents and supervisors there are also courses in administration, and in general and special methods, besides lectures on educational philosophy and theory.

II. College Students in Cornell or other universities who wish to use some of the "long vacation." In the case of graduate students, some of the work offered may be counted toward an advanced degree. Undergraduates may anticipate work and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount which may be obtained, are stated below, pages 9, 10.

III. Students entering the University and wishing to obtain advanced credit at entrance, or to complete the entrance requirements. It often happens that students have in June more or less than the requirements for admission to college. The Summer Session affords them the opportunity either to add to their surplus, and so, in some cases, to gain a year in time; or to make up their deficiency.

IV. All persons qualified to pursue with profit any course given, whether or not they are engaged in study or teaching.

STATISTICS OF ATTENDANCE, 1906.

The whole number enrolled in the Summer Session of 1906 was 642, representing 40 states and 15 foreign countries. Of this number 225

8 *Facilities—Admission—Attendance—Registration—Fees..*

were students during the previous winter ; 265 were persons engaged in teaching. Of these 27 were teachers in colleges, 15 in normal schools, 96 in high schools, 95 in grammar schools, 26 in private schools. Six school superintendents were also in attendance.

APPLIANCES AND FACILITIES.

All of the plant of the University, so far as it is needed, is available for use during the Summer Session, and students have all the advantages which the large and well equipped laboratories and shops, the museums and collections of material, and the magnificent library afford. For all students whose study involves out-of-door work the opportunities offered by the country immediately around the University can hardly be surpassed. Few students who have done field-work at Cornell have failed to be enthusiastic over the subject, or to express the highest satisfaction at the way in which real work and enjoyment of nature are combined.

ADMISSION—ATTENDANCE—REGISTRATION.

There is no examination for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of any course (unless it be elementary) that he is qualified to pursue the work. Any duly registered student of the Summer Session may visit such classes as he desires. Admission to the class-rooms is restricted to duly registered students. Persons wishing to have work done during the Summer Session counted towards an advanced degree must conform to the regulation stated under the heading "Credit for Work," page 10.

All students are required to register at the office of the Registrar, *Morrill Hall, Thursday, July 4, 9 a. m.—5 p. m.; or upon the day of their arrival, if they reach Ithaca later than July 4.* The office is open from 9 a. m. to 4 p. m. every day except Saturday when it is closed at noon.

TUITION FEE.

The single tuition fee for the entire Summer Session, whether one course or more be taken, is \$25. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal, for reasons satisfactory to the Treasurer and the Registrar, within five days from the first registration day, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks of the first registration day, one-half the tuition paid may be refunded. In case of registration

after the first three weeks of the session. students must pay two-thirds of the full tuition fee. No student is admitted without the payment of this fee. Sibley College students taking shopwork are not exempted. Admission to classes is restricted to duly registered students.

LABORATORY FEES.

Chemistry. A fee is charged for material actually consumed, and the student must make such deposit with the Treasurer as the instructor may prescribe.

Physics, Botany, Physiology. In each of these departments the fee is at the rate of \$1 for every five hours per week per term (or part thereof) of work in the laboratory. The entire amount must be paid to the Treasurer at the beginning of the term.

Physical Geography. For course B a fee of \$1 must be paid in advance to the Treasurer to cover incidental expenses of the course.

Shopwork. The fee for shopwork is at the rate of \$1 for every fifty hours spent in the shops. This must be paid in advance to the Treasurer. Students registered in Sibley College during the previous year are not required to pay this fee.

Vertebrate Zoology. See under Vertebrate Zoology, courses A and B, page 44.

Photography. See under Physics, course 18, page 30.

Library Deposit. See under Library, page 11.

ACADEMIC CREDIT FOR WORK.

In College of Arts and Sciences. The requirements for the degree of Bachelor of Arts are residence for eight terms (four years), and the completion of 120 hours of elective work. A student who has satisfied the entrance requirements of the College, and has afterward completed in two or more summer sessions at least 12 hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer session be accepted as the equivalent of more than one term of residence, or be counted for more than twelve hours toward graduation. The maximum amount of credit which is allowed for the work of any *one* summer session is seven hours.

In other Colleges of the University. The nature and amount of credit allowed in these for summer session work may be learned from the statements made in connection with the announcement of each course.

In Graduate Department. In order that work done by resident students in the Summer Session shall be credited towards an advanced degree, permission to this effect must be obtained from the faculty before the work is undertaken. Application for such permission must contain a detailed statement of the conditions under which such work is to be performed, and bear the approval of the professor in charge, as well as of the special committee.

This application must be made through Dean T. F. Crane, as Chairman of the Committee on Graduate Work.

Certificates for Work Done. Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. These certificates will bear the signature of the Registrar of the University, and also, *if requested*, that of the professor under whom the work has been done.

Application for them must be made before August 14, and the applicant must leave at the office of the Registrar a large sized envelope, stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met in every case.

The Department of Education of New York City will accept these certificates in place of examinations in certain subjects for teachers' licenses.

COST OF LIVING.

The cost of living in Ithaca during the Summer Session runs from \$5.50 per week upwards. In some cases the cost has been reduced to \$5, or even to \$4.50, but it is not safe to count upon less than \$5.

The price of a single furnished room may be as low as \$1 per week. The prices advance with the size and location of the rooms.

The price of table board runs from \$4 and \$4.50, in boarding houses, to \$7 and \$10 at the hotels. Living at hotels costs from \$10.50 up.

The University has one residence hall, the Sage College, and this will as heretofore be opened through the summer session for women and for married men accompanied by their wives. As the great majority of the persons living in these buildings during the session are attending the University for serious, earnest work, it is necessary that the rooms and halls should be quiet during the hours of rest. Persons unwilling to conform to reasonable regulations for securing this quiet are not wanted in the buildings. The price of rooms in Sage College is from \$1.25 to \$3.50 per week, according to location, and of table board \$4.25. The capacity of the building is usually engaged in advance, and early application is therefore advisable.

This should be made to the Manager, Mr. G. F. Foote, Sage College, Ithaca, N. Y. Every application for a room to be reserved must

be accompanied by a deposit of \$5, otherwise the application is not registered. The amount of this deposit is deducted from the rent if the room assigned be occupied by the applicant; it is refunded if the applicant give formal notice to the manager on or before June 15th that it is desired to withdraw the application altogether.

Without special permission, no person will be allowed to room in Sage College or Sage Cottage during the Summer Session unless registered as a student in the Summer Session.

The whole expense of attendance at the Summer Session, not including laboratory fees, may be estimated at \$60 to \$75.

A selected list of lodging and boarding houses in the vicinity of the University, with their prices, will be published about April 1st next, as a part of a handbook of general information to be issued by the Cornell Christian Association. Copies of this book will be furnished free upon application to the Secretary of the Association, Mr. A. L. Thayer, Barnes Hall, Ithaca, N. Y.

THE LIBRARIES.

The University Library Building is open on week days from 9 A. M. to 5 P. M. In this are housed the main library, containing about 300,000 volumes, and most of the seminary and department libraries. The main reading room, of which a view is given after page 28, affords accommodations for over 200 readers, and contains a selected library of over 8,000 volumes of reference works. Adjacent to it is the periodical room in which are kept the current numbers of about 500 journals in various fields of knowledge. The library has complete sets of most of these which form one of its most valuable features. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and of the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, allowed to a limited extent to take out books for home use. Persons wishing this privilege must make a deposit of \$5, which will be refunded upon the return of all books taken out. There are special libraries of Chemistry, in Morse Hall, and of Anatomy and Physiology, in Stimson Hall, which are open to students in these departments.

BARNES HALL.

This building stands in the center of the university grounds, and is the home of the Cornell Christian Association. It contains the offices of the association, several lecture rooms, and a library room with a choice collection of works on Biblical Literature. There is also a general reading room, supplied with papers and magazines, and

a lounging room for men, and also for women. Students coming to the summer session may have their mail addressed to them here if desired. The building is open every day.

The Christian Association will issue, about April 1st, a small hand book of information for prospective students. This will be mailed upon application to the Secretary, Mr. A. L. Thayer, Barnes Hall, Ithaca, N. Y.

GENERAL LECTURES. MUSICAL RECITALS.

There will be a series of lectures during the summer session on successive Monday evenings. These will be free to all persons. The general subject to be treated in 1907 will be Public Health as related to infectious diseases and to preventive medicine. Details will be given later.

Musical recitals on the organ in The Sage Chapel will be given each Tuesday and Thursday evening during the session.

RAILROAD ROUTES AND RATES.

Ithaca is reached by either the Lehigh Valley or the Lackawanna railroad. By the latter a branch leaves the main line at Owego. Through trains run from New York and Buffalo on the Lehigh, and through sleeping cars run daily from New York on both roads. From Philadelphia (Baltimore, Washington and the South via the Baltimore and Ohio) the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh through trains for Ithaca connect with the New York Central at Auburn and Canastota, and with the Pennsylvania and Erie at Elmira.

From points in Trunk Line Passenger Association territory, in New England and in Eastern Canada a special railroad rate of a fare and a third will be granted students of the Summer Session. This reduction can be obtained *only by application for the proper certificate when buying ticket to Ithaca*. For full information, and for directions as to form of application, apply to the Registrar, Cornell University, or to railroad agent at home office.

From remoter points Summer Excursions Tickets may be obtained. Students should enquire at their home offices when making their plans. Where a through rate can not be had, a ticket may be bought to a central point, and an excursion ticket from there, or in some cases an excursion rate to some place like Niagara Falls may be obtained, with a stop over privilege at Ithaca.

The Clyde line S. S. Co. offers special rates to students and teachers between Charleston, S. C., and New York.

COURSES OF INSTRUCTION.

EDUCATION.

Courses A, B and C will be found especially helpful for college graduates who are preparing for examination in professional subjects as outlined in the New York State Syllabus and Course of Study for the renewal of the College Graduate Certificate Limited. The State Education Department will hold an official examination for such candidates at Ithaca, August 19 and 20. Since it is permissible to do so, those who can should prepare for examination in two subjects this summer and for the remaining two a year later.

A. Principles of Education (including general method). Lectures, discussion and text-book study. Daily ex. S., 11. *Goldwin Smith 242*. Professor DEGARMO.

This course is designed to be an introduction to the general theory of education, both in its individual and its social aspects. The following are some of the leading topics : personality and environment as the presuppositions of education ; the educative institutions of society ; relation of democracy to education ; individual development ; the school as a social institution ; the doctrines of interest and formal discipline ; the course of study ; nature and educational value of the several studies ; methods of class room teaching and management. The methods of thinking used in real life are studied as a guide to methods in the school room. Text-book : De Garmo's "Principles of Secondary Education." Reference books, Thorndike's "Principles of Teaching"; Bagley's "The Educative Process"; De Garmo's "Interest and Education".

University credit, two hours.

B. History of Education. Lectures, discussions, text-book and prescribed readings. Daily except Sat., 10. *Goldwin Smith 242*. Professor DEGARMO.

The course makes a general survey of the history of education, and will follow in the main the topics and readings prescribed in the syllabus of the New York State Education Department for the guidance of college graduates. Special emphasis is laid upon the following topics : the education of the Greek people ; the rise and development of humanism ; the rise and development of science and scientific methods in education ; the doctrines of educational reformers ; the development of modern systems of education. Monroe's "Text-book in the History of Education."

University credit, two hours.

C. Educational Psychology. Lectures, discussions and readings. Daily except S., 8. *Goldwin Smith 256*. Assistant Professor WHIPPLE.

The lectures will present a system of functional psychology as applied to education, with particular reference to such topics as nervous plasticity, habit, attention and interest, instinctive response, association, apperception, memory, imagination, conceptual thinking, judgment and reasoning. Students are requested to purchase James' "Talks to Teachers on Psychology" and Kirkpatrick's "Fundamentals of Child-Study," and, if possible, to read these books before beginning the course.

University credit, two hours.

D. Adolescence and Methods in High School Science. Lectures, discussions and readings. Daily ex. S., 9. *Goldwin Smith 256*. Assistant Professor WHIPPLE.

This course is designed to be helpful to high school teachers, principals and superintendents and others who are interested in secondary education.

The first portion of the course is a study of the physical and mental characteristics of the adolescent with their significance for secondary instruction, including such topics as physical growth, modifications in sensory life, the development of the sex instinct, sex hygiene in the school, religious conversion, social organizations, adolescent crimes and insanities, the problem of coeducation, etc.

The second portion of the course treats of the attitude of the adolescent toward nature, and of the problems arising in the teaching of science in the high school. Attention is paid both to the history of the development of scientific method at large and to methods within the special sciences, particularly mathematics, physics, chemistry and biology.

University credit, two hours.

E. Special Method in Common School Branches. The selection and sequence of subjects in Literature and Reading, Language, History, Geography, Elementary Science, Arithmetic and Manual Arts. Daily except Saturday, 8, or at such hour as may be found more convenient. *Goldwin Smith 242*. Professor MCMURRY.

1. Special problems in various studies: The place and value of Literature in early grades. The use of complete stories and poems as wholes in upper grades.

2. Excursions in Geography and Nature Study.

3. Type studies in Geography, History and Elementary Science.

4. The essential elements of Manual Training.

5. A simplified course in Arithmetic. Illustrative lessons in various studies. Criticism and discussion of lessons presented. Application of general principles to class work.

University credit, two hours.

F. The Course of Study in the Elementary School. Brief history of the Common School in the United States. Daily except Saturday, 9 *Goldwin Smith 242*. Professor MCMURRY.

Forces which have shaped our present Course of Study. The present aims of the Common School and the relative worth of studies for accomplishing them. The over-crowding of the Course of Study.

The basis for selecting materials in the different studies. The simplification and organization of the Course of Study.

Useful eliminations and economies in the present course. The helpful relation of studies to one another in the general plan.

The value of a detailed course of study to teachers. A carefully graded course: Advantages and defects. Relation of the Course of Study to text books, reference books and libraries.

State Courses of Study. Courses for ungraded schools. The adaptation of a course of study to local needs. Teachers need to survey the course of study as a whole.

University credit, two hours.

G. Theory and Practice of Manual Training. There are several courses in this branch of education. For full description, see pages 46-50. See also under English, Latin, German, Greek, Mathematics, Biology, Drawing, Physiology, Geography, for courses dealing with the problems of teaching these branches.

PSYCHOLOGY.

A. General Psychology: Lectures and Exercises. M., W., F., 9. Text-book: Titchener's *Primer of Psychology*. Professor TITCHENER. *Goldwin Smith A*. Three or five hours.

This course is intended to serve as a general introduction to the study of psychology from the experimental point of view. After a consideration of the subject-matter, method and problem of psychology, mental states and processes are discussed in detail, in the order of increasing complexity. The first part of the course treats of sensation, affection and attention; the second part, of perception and idea, association, emotion, and the simpler forms of action; the third part, of memory and imagination, thought and self-consciousness, sentiment, and the complex forms of action. Wherever it is possible, the lectures are illustrated by experimental demonstrations. Two concluding lectures deal with the psychology of the abnormal, and with the province and relations of psychology as a whole.

If only the lectures and examinations are taken, this course counts as three hours, University credit, one hour: if the prescribed exercises are done, it counts as five hours, University credit, two hours.

B. General Psychology; Laboratory Practice. M., W., F., 2:30-5, with prescribed work on literature and record books. Text-book: Titchener's *Experimental Psychology, Qualitative*. Assistant Professor BENTLEY, Mr. GEISSLER and Mr. FERREE. *White Hall*.

In this course, the student repeats for himself, under experimental conditions, certain of the classical observations of human psychology. A wide range of selection is offered as regards individual experiments; but the work will be restricted, for the most part, to experiments upon sensation and perception, affective process, attention and impulsive action. The course counts as five hours, University credit, two hours.

C. Abnormal and Animal Psychology. M., W., F., 8. Assistant Professor BENTLEY. *White Hall*.

The first part of the course will cover the typical forms of mental abnormality. The lectures will define and illustrate the terms 'abnormality,' 'derangement,' 'mental disease' and 'alienation,' and will discuss, in order, (1) minor mental derangements (illusions, hallucinations, dreams and hypnosis); (2) the more serious and permanent disorders (including hysteria, epilepsy, and the various insanities), and (3) deficient and exceptional minds (congenital blindness and deafness, color blindness, aphasia, general arrested development, the phenomenal chess player and calculator, the genius, the habitual criminal and the 'degenerate'). The last part of the course will include lectures on the psychology of selected animal forms (*e.g.*, unicellular organisms, the ant, the frog, the sparrow, the cat and the monkey). Besides an analysis of the animal consciousness, the course will include a discussion of the origin and development of mind in the race at large.

The lectures (three a week) will be supplemented by collateral reading, abstracts, and occasional essays by the student. This course may be taken along with Course A, and counts as five hours, University credit, two hours.

D. Advanced Psychology. Essays and prescribed reading; quantitative laboratory work; laboratory problems. Hours to be arranged. Professor TITCHENER, Assistant Professor BENTLEY, Mr. GEISSLER and Mr. FERREE.

PHILOSOPHY AND LOGIC.

A. The History of Philosophy in the Eighteenth and Nineteenth Centuries. Daily ex. S., 12. *Goldwin Smith 225*. Professor CREIGHTON.

In this course it is proposed to deal topically rather than biographically with the development of philosophical ideas during the last two centuries. The principles and conceptions underlying the rationalistic thought of the 18th century will be analyzed and explained, and their practical consequences traced in the resulting theories of knowledge and of morality, and in the fields of politics and literature. The growth and development of modern historical and evolutionary modes of thought will then occupy attention, and the course will conclude with an outline of the standpoint and attitude of philosophy at the present day. University credit, two hours.

B. Logic. Daily ex. S., 8 (or at an hour to be arranged). *Goldwin Smith, 225.* Professor CREIGHTON.

So far as time permits this class will cover the same ground as the elementary course in logic that is given during the regular session of the University. It will include the more essential and practical parts of Deductive Logic, the logic of the Inductive Methods, and an outline of the modern theories of the nature of Judgment and the Evolution of Thought.

University credit two hours.

ENGLISH.

A. Rhetoric. Lectures and Recitations. Daily ex. S., 8. *Goldwin Smith, 124.* Mr. MITCHILL.

This course will aim to cover the field of rhetoric in a practical way, considering the written and spoken language from various points of view and in its various elements (words, sentences, paragraphs, wholes). Emphasis will be laid upon violations of good usage as exemplified in the more common blunders made in speech and in writing. In this connection there will be a brief review of those phases of English grammar of which an intimate knowledge is essential for ready guidance to good usage. To a limited extent students will investigate differences in usage as exemplified in various English dictionaries.

This course will be of especial value to foreigners, to teachers of all grades of school work, and to others wishing to improve their knowledge of the English language.

University credit, two hours.

The principal texts to be used in recitation or for reference will be: Brooks and Hubbard's *Composition-Rhetoric*, Carpenter's *Rhetoric and English Composition*, Hill's *Beginnings of Rhetoric and Composition*, Mitchill and Carpenter's *Exposition in Class-room Practice*,

Scott and Denney's *Paragraph Writing*, Stebbins's *A Progressive Course in English*.

B. Composition. Lectures and Daily Themes, Daily ex. S., 9. *Goldwin Smith 124.* Mr. MITCHILL.

This course will aim to develop practical ability in various types of composition. After preliminary presentation of selections illustrative of a given type of writing and discussion of the characteristics of that type, there will be assigned to students a specific problem of like sort to be worked out as a theme. Special emphasis will be laid on the most common phases of narration, description, and exposition. If time permits, some work will be done in argumentation. In order to make the course as effective as possible, the instructor or his assistants will hold a personal conference with each student once in each week. It is advisable that all except those exceptionally well equipped in English take in conjunction with this course English A.

This course will be of value to all who wish to improve their power of expression in language.

University credit, two hours.

The principal texts to be used for reference will be; Brooks and Hubbard's *Composition-Rhetoric*, Lamont's *English Composition*, Mitchill and Carpenter's *Exposition in Class-room Practice*.

C. The Study of Literature. Lectures, Discussions and Readings. Daily except Saturday, 10 *Goldwin Smith 164.* (Readings, Friday, 10.) Assistant Professor COOPER.

A course designed more particularly for teachers of English; but in general for such as are interested in modern languages and literatures. The lectures will deal with topics like the following:

General scope and purpose of the study of literature: Interpretation and Criticism. The problem of teaching literature in the United States: difficulties, means and end. Private reading and study for teachers. A nucleus of books for the library of a teacher of English. English literature and the Bible. English literature and the Greek and Latin classics. The College Entrance Requirements. The proper emphasis on the study of poetry. Epic poetry as adapted to the needs of the schools.

Rules for obtaining University credit, two hours, announced at first lecture.

The Discussions will be based on outside reading of Cook's *Higher Study of English*, and a number of briefer articles in magazines, etc.

The Reading will be chosen in part from well-known epic poems, so far as these are accessible in English.

D. Earlier Poems of Coleridge. *The Rime of the Ancient*

Mariner. Lectures, Discussions, and Readings. Daily except Saturday, 12. *Goldwin Smith 164*. (Readings, Friday, 12). Assistant Professor COOPER.

A typical study of one of the poems in the College Entrance Requirements; with the aim of showing, not how a piece of literature should be taught in the schools, but how the teacher should know such a piece of literature himself. Probably the best version of the *Ancient Mariner* for use in the classroom is in Syke's *Select Poems of Wordsworth and Coleridge*.

The Discussions will be based upon a limited amount of outside investigation.

Rules for obtaining University credit, two hours, announced at first lecture.

The Readings will include selections from *Lyrical Ballads*.

E. The Teaching of English in Secondary Schools. Lectures, Discussions, Reports, and Illustrative Teaching. Daily except Sat., 11. *Goldwin Smith 124*. Mr. STEBBINS.

This course is intended for teachers who desire to work out more in detail the provisions of the New York State syllabus, for persons who wish to equip themselves for teaching English in secondary schools, and for those who desire to prepare themselves for teaching more advanced classes.

The general purpose of the course will be to consider the actual problems that the teacher is called upon to solve in the class-room and to study methods of teaching. Practical methods of teaching language, composition, English classics, and literary history will be taken up in detail.

Language will be considered with respect to both oral and written discourse, special attention being directed to bad English and to the acquiring of a vocabulary.

In composition the plan will be to study the best means of obtaining practical results with the various types of theme writing. Stress will be laid upon the sentence, the paragraph, letter writing, the simple narrative, the various forms of description, mechanical exposition, the character sketch, formal argumentation, and the examination question and answer.

In the literature work, certain representative classics, such as *The Vision of Sir Launfal*, Irving's *Sketch Book*, *Silas Marner*, *Macbeth*, Milton's *Minor Poems*, and Burke's *Speech on Conciliation*, will be treated as types, the aim being to show what can be accomplished with a certain book during a particular term of the high school course. Other books may be considered if time permits.

A few lectures will be devoted to problems presented by the new state syllabus in connection with the requirements in literary history.

Much attention will be given to the task of combining the many elements of English work into a harmonious and practical course of study.

Those intending to take this course are requested to bring to the Summer Session copies of the texts named above. By familiarizing themselves with the required texts of the New York State syllabus, students will be enabled to derive especial benefit from the course. It is advisable that all students who are not well acquainted with the required literature or with the principles of rhetoric and composition should take the courses dealing with these subjects.

The principal books to which reference will be made in this course, are:—Brooks and Hubbard's *Composition—Rhetoric*; Lamont's *English Composition*; Mitchill and Carpenter's *Exposition in Classroom Practice*; Scott and Denuy's *Paragraph Writing*; Stebbins's *A Progressive Course in English for Secondary Schools*, first year book and second year book; Pancoast's *Introduction to English Literature*.

FRENCH.

A. **Grammar and Reading** for beginners. The grammar used will be Fraser and Squair's *Abridged French Grammar*. The object of the course is to give to those who have had no French the opportunity of learning the essentials of grammar and reading, which require as a rule, a whole year's study. To accomplish this end very intensive work must be done. Two recitations a day will be held, with sufficient time between the two for the preparation of the second lesson, and the student is expected to devote his entire time to the subject. Daily, 9 and 2. *Goldwin Smith*, 283. Assistant Professor OLMSTED. University credit, six hours.

B. **The Rapid Reading of the Advanced Requirements** for admission in French:

Pailleron's *L'Étincelle*, Merimée's *Colomba* (Cameron), Kuhn's *Selections from the Poetry and Comedies of Alfred de Musset*, Bouvet's *French Composition*. In addition to the reading required, the grammar will be reviewed and composition work carried on all through the course. The purpose of this course is to enable those who have had the elementary requirement for admission to make up by extra work the advanced requirement. Two recitations a day will be held, with sufficient time between the two to enable the student to prepare for the second recitation. Students taking the course are expected

to devote their entire time to the work. Daily, 8 and 12, *Goldwin Smith*, 277. Assistant Professor GUERLAC. University credit, six hours.

C. Lectures in French. *The French dramatists of the nineteenth and twentieth centuries.*

This course is intended for students who have already some practice in understanding spoken French and are willing to do some reading on the French theatre. T., Th., 11, *Goldwin Smith* 277. Assistant Professor GUERLAC. University credit, one hour.

GERMAN.

A. Elementary German Grammar and Translation. The text-books in this course will be Bierwirth's *Beginning German* and Hewett's *German Reader*. The object of this course is to afford an opportunity for those who have had no German, to master the essentials of the grammar and translation during the period of the Summer Session. An opportunity will thus be presented for those whose preparation in German is inadequate, to do the entire work in elementary German (German 1), required for admission. Two recitations a day will be held with ample time between the two for the preparation of the second lesson. The student is expected to devote his entire time to this subject. Daily, 8 and 12, *Goldwin Smith* 190. Dr. THAYER. University credit, six hours.

Dr. Thayer will be in attendance in *Room 178*, T., Th., at 9, to afford special assistance to students who desire it.

B. The Rapid Reading with comment of the Advanced Requirements for Admission in German: Freytag's *Journalisten*, Schiller's *Wilhelm Tell*, Goethe's *Hermann and Dorothea*. The purpose of this course is to enable students who are deficient in the advanced requirements for admission to make up by extra work the entire amount required in this course. Two recitations a day will be held, with a sufficient interval to enable the student to prepare for the second recitation. Students electing this course are expected to devote their entire time to this subject. Daily, 8 and 12, *Goldwin Smith* 183. Assistant Professor POPE.

Dr. Pope will be in attendance in *Room 188*, T., Th., at 9, to afford special assistance to such students as desire it.

C. The Evolution of the German Novel. This course will treat the German novel of the 19th century and will emphasize those phases of intellectual and cultural life of Germany which, since Goethe, have influenced the evolution of the modern novel. The

work will include lectures in German, preparation and discussion of papers by the members of the class.

Daily, except Sat., 9. *Goldwin Smith 177*. Dr. PAULS. University credit, two hours, with collateral reading, 3 hours.

D. Advanced Composition and Conversation.

This course aims to familiarize the students with the use of the written and spoken language. Papers will be read and discussed, and oral practice will be given based upon Paszkowski's "Lesebuch zur Einführung in die Kenntnis Deutschlands und seines geistigen Lebens." (2d edition, Berlin, 1905.) Daily except Sat., 10, *Goldwin Smith 177*. Dr. PAULS. Credit, 2 hours.

Dr. Pauls will be in attendance in Room 178, Goldwin Smith Hall, M., Th., at 11, to afford special assistance to students who desire it.

GREEK.

A. Course for Teachers. The following topics are treated in lectures and practical exercises :

a. The elements of phonetics, and the analysis of sounds in Greek and in English. Theory and practice in the pronunciation of Greek. The relation of Greek to Latin and to English. The knowledge of linguistics essential for a teacher. Anatomical preparations are used to study the physiology of speech.

b. The teaching of Homer. Special consideration will be given to these points : The language, the metre, the principles of interpretation, the aim and method of translating, the English translations from Chapman to the present. The most helpful editions of the Iliad and other auxiliary works will be examined, with special attention to recent school editions. Selected portions of books I-VI will be studied.

Daily except Sat. 8. *Goldwin Smith 137*. Professor BRISTOL.

LATIN.

The summer session courses in Latin are intended primarily for actual or prospective teachers of Latin. Their object is two-fold :

1. By means of a course in Latin Grammar and one in Latin Composition, to give a clear and adequate knowledge of the essential facts of that period of the Latin language which is represented by such writers as Cicero and Caesar.

2. By a series of lectures on Latin literature accompanied by translations of selected masterpieces of that literature. To encourage on the part of teachers of Latin whose reading has not been extensive, the definite planning of courses of private study and home reading.

In this way the teacher of Latin will be better prepared for the technical work of the class-room, and will also gain a real enthusiasm and inspiration for solid individual development beyond the regular routine of such authors as Cicero, Caesar, and Virgil which are regularly read with classes year after year.

Any communication or inquiry concerning the work in Latin during the summer session will be welcomed and promptly answered by Professor Durham. Address, 7 South Ave., Ithaca.

A. The Essentials of Latin Grammar. Lectures on the language of Cicero and Caesar, with discussions as to how accurately their usage is recorded by our current Latin grammars; the foundation and justification of our grammatical categories; what is the essential truth in the conflicting statements of our American grammars; what forms, syntax, and composition should be taught in preparatory work; methods of pronunciation; hidden quantity; the reading of Latin verse; difficulties and problems which confront the high school teacher of Latin. Daily except Saturday, 10, *Goldwin Smith 128*. Assistant Professor DURHAM.

University credit, two hours.

B. Latin Composition. A systematic drill in connection with the lectures on syntax in Course A. Sentences from dictation illustrating the most important classical constructions, especially the *cum*, *qui*, *antequam* and *priusquam*, and *dum* clauses, substantive clauses, indirect discourse, and the subjunctive mood. Daily except Saturday, 11, *Goldwin Smith 128*. Assistant Professor DURHAM.

University credit, two hours.

C. Latin Literature. 1. Roman Comedy; Plautus and Terence. The *Phormio* of Terence. 2. Lucretius. 3. Catullus. 4. Cicero. The *de Senectute*. 5. Ovid. *Metamorphoses*, *Fasti*, *Epistulae*, *Tristia*. 6. Virgil. The *Georgics*. 7. Horace. Odes and Satires; the Art of Poetry. 8. Tibullus and Propertius. 9. Martial. 10. Tacitus. The *Germania*. M., W., F., 12 M., *Goldwin Smith 128*. Assistant Professor DURHAM.

University credit, one hour.

Supplementary Lectures (one each week).

1. Pompeii and its inscriptional remains. 2. The Roman Forum in the time of Cicero. 3. The quantitative reading of Latin poetry. 4. The Roman provincial system. 5. The historical setting and the legal aspects of Cicero's orations against Catiline. 6. The Latin language, its development, extension, and descendants.

SPANISH.

A. Grammar and Reading for beginners. The grammar used will be Giese's Spanish Grammar and Reader in connection with Marión y des Garennes's *Introducción á la Lengua Castellana*. The object of this course is to afford an opportunity to those who have had no Spanish, to acquire the essentials of the grammar, to translate easy Spanish readily and to read Spanish as Spanish understandingly. The ground covered is that to which a whole year is ordinarily given. To do this work in six weeks, determined application is necessary. Two recitations a day will be held with sufficient time between the two for the preparation of the second lesson. The student is expected to devote his entire time to this subject. Daily 8 and 12. *Goldwin Smith, 290.* Mr. GORDON. University credit, six hours.

HISTORY.

A. The American Revolution—from 1760 to 1787. Attention will first be given to the fundamental causes of the Revolution. The nature of the problem which England met after the treaty of Paris will be studied and the reasons why England failed in the solution. The organization of the revolutionary forces in America, the nature of the opposition, and the character of the Revolution as a civil war will be emphasized. The democratic nature of the Revolution will be shown by a study of the state constitutions of the period, and the relations between Congress and the states will be given special attention. English politics and French aid will be considered and the results of the American success. The study of the period will be closed with a general view of the troubles in the Confederation period and of the Federal Convention. Daily, except Saturday, 9, *Goldwin Smith 234.* Professor VAN TYNE.

B. The Expansion of England in America—from 1607 to 1760. This course will begin with a study of the nature and spheres of influence of the English Trading Companies and the struggle with Spain for supremacy on the sea. The economic and social conditions in England prior to the migration to America will be considered, and the religious persecutions as a factor in inducing migration. Special attention will be given the development of the English colonial policy, and the general relations of colony with mother country. Another purpose will be to note the transmission of culture from England to the colonies. Daily, except Saturday, 11, *Goldwin Smith 234.* Professor VAN TYNE.

C. From the Crusades to the Reformation. A study of the beginnings of modern life and thought, with especial attention to the

rise of intellectual and religious liberty. The course will deal with the results of the Crusades; the rise of the cities, and the development of commerce, of industry, and of culture; the creation of the universities; the birth of the modern states and the growth of absolute monarchy; the revival of letters, of art, and of science; the advent of fire-arms and of printing; the age of discovery; the revolution in religion and in society; the beginnings of tolerance and of freedom of thought. Daily, except Saturday, 10, *Goldwin Smith*, 245. Professor BURR.

D. **Historical Method.** A practice-course preparatory to the teaching of history and to historical research. The course will discuss the nature, the scope, and the aims of history; the methods and resources of the historical teacher; the processes of historical investigation, criticism, and interpretation; the literature of history as a science and as an art. The class will be a co-operative one, and all its members may expect to be set definite tasks. Daily, except Saturday, 12, *European History Seminary Room*. Professor BURR.

E. **Paleography and Diplomatics.** Professor BURR will be glad to give instruction, should any desire it, in the reading of historical manuscripts and the interpretation of historical documents. Place and hours to be arranged to meet the convenience of such a class.

ECONOMICS AND POLITICAL SCIENCE.

A. **The Principles of Economics.** In this course those principles of economics will be taken up for study and discussion that are of special importance at the present time either because of their practical bearing on American affairs or because of the part they play in contemporary economic theories. The treatment will be mainly topical, and as far as possible will be adapted to the preparation and special needs of the students taking the course. The work will consist of assigned readings, lectures, and discussions; and students are advised to accompany the class-room exercises with collateral reading in some brief text-book, such as Seager's "Introduction to Economics", Fetter's "Principles of Economics", or Gide's "Principles of Political Economy" (2nd American Edition). The aim of this course is not only to give facts, but also to consider methods of teaching, and especially the best methods of preparing pupils for the observation and unbiassed study of economic problems. M., T., W., 10, *Goldwin Smith*, 264, and one two-hour session each week for special discussion, led by students. The time for this session will be arranged with the class. Professor PAGE.

B. The Economic Aspects of American History. This course attempts to show how American experience illustrates economic principles, and how American political and social development has been influenced by economic conditions. Among the topics treated will be the economic foundations of colonial life, the material reasons of the demand for national independence, the influence in shaping political and social institutions exerted by industrial growth, immigration, westward expansion, etc. The method of study will be mainly historical, and the work will consist of assigned readings, lectures, and discussions. M., T., W., 11, *Goldwin Smith*, 264, and one two-hour session each week for special discussion, led by students. The time for this session will be arranged with the class. Professor PAGE.

C. The Principles of Government. This course is designed primarily for teachers of Civil Government. For those who wish to pass examinations, readings will be assigned covering the main facts in Civil Government as indicated in the Regents' Syllabus. In the class-room, however, the emphasis will be laid upon the more fundamental principles of Politics and their application in the governments of certain typical modern states. The course will be conducted by the seminary method. M., T., W., 2. *Goldwin Smith*, 269, and one two-hour session each week for special discussion led by students; the time for the two-hour session to be arranged to suit the convenience of the class. Assistant Professor KEMMERER.

D. Practical Economic Problems. This course will be devoted to the study of certain economic problems which are at present agitating the public mind. The subjects chosen for study this year will be the trust problem and the labor problem. The subjects will be treated topically, and an attempt will be made to familiarize the student with the more important literature relating to these problems. M., T., W., 3. *Goldwin Smith*, 269, and one session of two hours to be arranged at some time convenient to the class. Assistant Professor KEMMERER.

MATHEMATICS.

Courses A, B, and C are equivalent, respectively, to the advanced entrance requirements of Cornell University—also to those of the College Entrance Board. They presuppose a ready knowledge of Elementary Algebra (through quadratics), and of Plane Geometry. The work will consist largely of recitations from text-books.

University credit: 3 hours for each course.

A. Advanced Algebra. Daily ex. S., 11, *White 11*. Professor TANNER.

B. Solid Geometry. Daily ex. S., 9, *White 2*. Assistant Professor FITE.

C. Trigonometry. Daily ex. S., 8, *White 4*. Assistant Professor HUTCHINSON.

Courses D, E, and F are equivalent, respectively, to (a), (b) and (c) of Course 2 in Mathematics, regularly given during the academic year. Course D presupposes A, B, and C; E presupposes D; and F presupposes E. The work will consist largely of recitations from text-books.

University credit : 3 hours for each course.

D. Analytic Geometry. Daily ex. S., 10, *White 4*. Dr. CARVER.

E. Differential Calculus. Daily ex. S., 9, *White 17*. Assistant Professor SNYDER. Daily ex. S., 11, *White 4*. Dr. CARVER.

F. Integral Calculus. Daily ex. S., 8, *White 2*. Assistant Professor FITE. Daily ex. S., 9, *White 4*. Assistant Professor HUTCHINSON.

G. Elementary Algebra. Teachers' Course. This course includes an historical and critical study of the subject-matter of Elementary Algebra. Proper attention will be paid to the pedagogy of the subject also, and to the correlation of Algebra with allied subjects.

The course is open to teachers of mathematics only, and does not meet college entrance requirements. It will consist chiefly of lectures, although discussions and reports will form an important part of the work. Daily ex. S., 10, *White 11*. Professor TANNER.

University credit for this course is 2 hours.

H. Projective Geometry. In this course the principles underlying projective forms and constructions of the first and second degrees will be carefully developed. Particular attention will be paid to the application of these principles to elementary geometry, so as to make the work helpful to teachers of this subject. No knowledge of mathematics beyond plane geometry will be presupposed. Daily ex. S., 8, *White 17*. Assistant Professor SNYDER.

University credit for this course is 2 hours.

PHYSICS AND PHOTOGRAPHY.

All courses are given in Rockefeller Hall.

Most of the courses announced below are given during the year as regular University work. Both recitation and laboratory work will be adapted as far as possible to meet the individual needs of teachers who wish to review special portions of the subject or who are unable to take complete courses.

Courses recommended for teachers are 1, 5, 6 and 10, and those having the requisite preparation to pursue more advanced work with advantage may take Courses 14, 25 or 25a.

Regular University students may receive credit on any of the courses corresponding to the work of the regular year and requirements for entrance to any of these courses for such students will be the same as during the regular school year. (See end of each course announced for amount of possible credit.)

Course 18 in Practical Photography may be taken by anyone registered in the summer school, but if University credit is desired a knowledge of Physics and Chemistry, such as may be expected of students who have completed Course 1 in each subject, will be required.

1. Lectures in General Physics. The aim of this course is to show the experimental basis of physical science. The work covers one-half of that given during the regular year and no previous knowledge of Physics is required. For those who possess a general knowledge of the subject, and for teachers, the course will afford a review useful for laboratory and advanced work and giving suggestions as to means of illustration of essential phenomena of Physics which may be applicable where the equipment is much less extensive.. The topics for 1907 will be Heat, Light and Electric Current. Daily except Saturday at 12. *Lecture Room A.* Assistant Professor SHEARER.

University credit for this course is 2 hours.

1a. Consultations with teachers and students. Consultation regarding subject matter of physics, equipment of laboratories or other matters of interest to physics teachers or students. By appointment, Tues. and Thurs., 9-10. Assistant Professor SHEARER.

5. Recitations in connection with Lecture Course 1. The course combines supervision of lecture note books and explanation of points not fully covered in the lectures. Suitable exercises and problems with references to text books will be given in connection with this course. Daily except Saturday at 8. *Room 106.* Mr. GAGE.

University credit 1 hour.

6. Recitations for those who have completed Course 1 or Courses 1 and 5 or their equivalents. This course is intended to develop the theory of the subject and to give a fairly rigid drill in its application. Considerable attention will be given to graphic methods and to problems. Watson's Text Book of Physics will be used. The first half of the work of the regular year will be covered in 1906.

Daily except Saturday at 8. *Room 106.* Mr. GAGE. University credit 2 hours.



North Part of Campus, Cayuga Lake in the Distance.



University Library—Main Reading Room.



In Fall Creek Gorge on the Northern Boundary of the Campus.



View from above Ithaca Falls. Northwestern Corner of the Campus.

8. Recitations in General Physics. This course is intended for those students who have had the requisite elementary training in general physics and who wish to pursue the subject more in detail with a view to going into more advanced work in Physics or into engineering. The work in recitations is to be accompanied by work in the laboratory in course 14. Courses 1 and 5, or 1 and 10, lead up to the course. *Rooms 105 and 108.* Assistant Professor BLAKER and Messrs. GAEHR and DORSEY.

10. Physical Laboratory. This course is one primarily designed for teachers of elementary physics and those students who desire to study more thoroughly elementary physical principles in the various branches. In general the simpler forms of apparatus are used but of such a grade as to adapt them to the needs of careful investigators. In general the apparatus is not set up, in order that the student may get the practice not only of making observations but also of making things go. The apparatus available affords study in units and their relations, statics, kinetics, molecular physics, light, sound, electricity and magnetism. For the work in the summer session courses may be arranged at the beginning of the term for each individual student covering as many or as few of the general divisions of the subject as seems desirable. These courses may be varied to meet the needs of the students as the work progresses, as in all cases individual instruction is given, and it is not necessary for any two students to follow the same outline. The idea is to make the work as flexible as possible, giving each student work in his chosen line.

Occasional discussions of general interest may be held covering such subjects as methods of making observations and of using them to the best advantage, accuracy of results, computations, errors, the interpretation of data by means of curves, the theory of particular experiments and such other topics as may come up from time to time.

University students having the requisite requirements for admission to course 10 in Physics as given in the register for the year 1906-7 may elect this course, following the schedule prescribed for regular work during the academic year.

One to five three-hour periods per week throughout the session. Daily ex. S., 9-12. Assistant Professor BLAKER and Mr. DORSEY.

14. Physical Experiments. Theory and method of Physical Measurements. The course presupposes a thorough course in elementary physics, both in text and laboratory. It consists in the setting up and adjustment of apparatus and the performing of fundamental experiments; a study of limitations, errors, and methods of computation; and interpretation of results, both analytically and graphically.

The apparatus available makes it possible to make accurate measurements in the different branches of general physics. A few of the subdivisions that may be covered are in friction, work, power, efficiency, uniformly accelerated linear and angular motions, moments of inertia, coefficients of expansion of solids, liquids, and gases, vapor tension and vapor density, the usual determinations in heat; the study of thermometers, their accurate calibration and comparison, a thorough study of the analytical balance, including a determination of its errors and limitations. In sound, studies may be made in resonance and interference. The work in light comprises a study of lenses, the grating, the adjustment and use of the spectrometer, photometry of various light sources. The equipment in electrical and magnetic apparatus is such as to afford special facilities for the determination of electrical and magnetic constants and work in electrical measurements such as the measurement of current, electromotive force, resistance, self and mutual induction, capacity, study of the magnetic properties of iron and the use of standard instruments of theoretical and practical nature.

The work being individual, courses may be planned to suit the needs of the student which may cover as many or as few topics as seem desirable. Reports on the work done are to be submitted covering theory and results. These reports form the basis of criticism of the work done.

In connection with the laboratory there is a reading and computing room in which may be found many works of reference which will be found very useful in working up the subjects studied.

The regular University credit that it is possible to receive in this course during the summer session varies from one to four hours.

One to five three-hour periods per week during the summer session. Daily ex. S., 9-12. Assistant Professor BLAKER and Mr. GAHR.

18. Practical Photography. Lectures and Laboratory work. The lectures in this course will be fully illustrated and demonstrations of all the fundamental processes will be included. The laboratory will be open daily (except Saturday) from 2 to 5 with the exception of Tuesday and Thursday 4-5, which is reserved for lectures. Students have the privilege of taking Department cameras for outdoor work forenoons and Saturdays, when the laboratory is closed. Instruction and practice will be given in *exposing, developing, printing and mounting*. Also in *enlarging* from negatives or pictures, *copying and photo-micrography*. *Special attention will be given to making lantern slides from negatives and pictures* and to the adjustment and use of the projection lantern. The department equipment for this

work consists in part as follows :—Hand and view cameras, 4×5 and 5×8 , a fine Reflecting camera with Unar lens for very short exposures of moving objects, an enlarging camera, with a 5×8 Planar lens, and a Photo-microphotographic camera for enlarging from microscope slides. For exposure in dark weather Cooper Hewitt Mercury Vapor Lamps are used. Many other pieces of apparatus show the application of photography in various phases of scientific work.

The natural beauty of the campus and the surrounding lake, hills and ravines, afford ample scope for outdoor work. The opening of the photographic laboratory to summer students offers a fine opportunity to receive instruction in a useful and delightful subject and at the same time to secure views making valuable reminders of their visit.

Students furnish their own plates, paper and developer and may use either their own cameras or those belonging to the Department as they choose. The laboratory fee which covers incidental expenses of the department is \$3.00. At least eight hours of laboratory work per week is required for University credit. Daily except Saturday 2 to 5. Lectures, Tuesday and Thursday at 4, *Photographic Laboratory*. Assistant Professor MOLER.

25. Advanced Laboratory Practice. This course in general physics is open to those students who have had Course 14 or its equivalent and are desirous of taking up special subjects for a detailed study, putting much more time on a single problem than is advisable in Course 14. One of the features of this course is the performing of classical experiments and the study in detail of errors and instrumental constants and correcting for them or eliminating them to the greatest degree possible.

The course is intended for those students who desire at some time to do advanced laboratory work in research, and for teachers in laboratory physics in colleges. Such research problems as can be completed in the time available may be undertaken by special arrangement. The apparatus available for this work is of a superior quality and lends itself to the best grade of work.

The University credit to be given in this course varies with the amount of work done. The laboratory will be open daily from 9 to 12 excepting Saturday. Assistant Professors BLAKER and SHEARER.

25a. Laboratory practice in applied electricity. This course is designed for those students and teachers in physics who desire to get a knowledge of the principles of direct and alternating current dynamos and motors, transformers, induction motors, etc. The

apparatus consists of such small machines as are easily taken apart and reassembled to work in different ways. The characteristics and efficiencies of the different systems may be studied.

This course *is not open to engineering students for university credit.*

The hours of university credit for students in Arts and Sciences depend on the time devoted to the laboratory and the work done. Daily except S., 9 to 12. Assistant Professor BLAKER.

CHEMISTRY.

All work is in Morse Hall.

A. **Introductory Inorganic Chemistry.** a. Lectures. Daily, except Sat., 12, *Ch. L. R. 1.* Assistant Professor BROWNE. The lectures deal with the fundamental theories and laws of chemistry and with the more common elements and their compounds. They are profusely illustrated by experiments. The course is primarily designed to meet the needs of teachers in secondary schools, and to that end emphasis is laid upon methods of lecture presentation and experimental demonstration. Students other than teachers must, before registering, satisfy the Department that they are properly prepared to carry on the work.

b. Laboratory work. M. W., F., 8-12, and T., Th., 9-12, Mr. SHETTERLY. In the laboratory there is given a series of experiments designed to illustrate the fundamental laws of chemistry and to acquaint the student with the properties of the principal elements and their compounds. For the benefit of teachers who may take the course especial attention will be given to methods of laboratory instruction, quantitative experiments and to the blowing of simple glass apparatus.

c. Recitations. T., Th., 8, Mr. SHETTERLY. The recitations deal with the subject matter of the lectures and with the experimental work carried on in the laboratory; they also comprise thorough drill in the solution of chemical problems.

Course A is equivalent to Course 1 in Chemistry, offered during the University year.

C. **Qualitative Analysis.** Elementary. Lectures and recitations. M., W., F., 11. Laboratory, daily except S., 1:30 to 4:30 Mr. SNOWDON. Elementary course for those who have had the equivalent of course A. A study in laboratory and class-room of the methods for detecting and separating the principal bases and inorganic acids. This is followed by the analysis of various substances, either in solution or in solid form, the composition of which is unknown to

the student. Considerable emphasis is laid upon the writing of equations expressing the reactions involved in the work.

D. Qualitative Analysis. Lectures and recitations. T., Th. 11. Laboratory, daily except Sat., 1:30 to 4:30. Mr. SNOWDON. A more advanced course for those who have had the equivalent of Course C. This course will include :

1. A study in laboratory and class-room of the methods of detecting each of the important acids in the presence of the others, together with the reactions involved, followed by the analysis of more complex mixtures than those assigned in course C.

2. A comparative study in the laboratory of different methods for detecting and separating the bases. 1 and 2 may be taken together if desired.

E. Quantitative Analysis. Elementary. Two lectures, and 10 hours in the laboratory per week, at hours to be arranged. Mr. CUSHMAN. An introduction to quantitative methods and the chemistry upon which these methods are based. Lectures, explanatory of the methods used, are first given : each student then performs simple analyses which involve the use of the apparatus ordinarily employed in analytical work.

Advanced work (see course F) may be taken by students who complete this course before the close of the session.

F. Quantitative Analysis. Advanced. Laboratory practice. Mr. CUSHMAN. Special methods of quantitative analysis, both gravimetric and volumetric, such as are employed in the analysis of organic substances, iron ores, iron and steel, slags, paints, lubricants, coal and coke, cements and cement materials, alloys, ores of copper, lead, zinc, mercury, manganese, tin, etc.

GEOGRAPHY.

The object of the courses in this department is two fold : first to give instruction on subject matter and method in physical geography, including laboratory and field work, for teachers in high schools, normal schools, and colleges ; and secondly, to offer in connection with these courses others on subject matter and method for geography teachers, both in the grades and in the secondary schools. The work embraces lectures, conferences, field excursions, laboratory work and supplementary reading. The laboratories are equipped with an excellent teaching collection of maps, specimens, photographs, and models, besides fully 5,000 lantern slides on geographic and physiographic subjects. The region about Ithaca is rich in geographic features, both physical and industrial, and frequent ex-

cursions are made to places of special interest. For an outline of these excursions see synopsis on pp. 36 and 38.

University Credit. Upon handing in the required reports and passing examinations, regularly matriculated students may receive four hours University credit for the three courses A, B and C combined. Courses D, E and F, with required reading, each count two hours. University students desiring to receive credit in courses G or H must first consult Mr. WHITBECK.

A. Physical Geography. A lecture course upon general physical geography, not including the atmosphere. Some of the topics discussed are : rivers, plains and plateaus, shore-lines, mountains, volcanos, glaciers and the glacial period ; the ocean, its composition, movements and work ; the relation to man. The lectures will be fully illustrated by lantern slides. Students electing this course are advised to take also the two related courses, B and C, and course D, Meteorology and Climatology.

Geological Lecture Room. M., T., W., Th., 9. Professor TARR.

B. Laboratory Course in Physical Geography. A practical course to illustrate laboratory work in high-schools. Attention is given to the possibilities open to teachers in schools having limited laboratory equipment. So far as possible the work offered will be arranged to meet the individual needs of teachers. Among the topics treated are the following : Common minerals and rocks ; rock structures ; weathering and soil formations ; and the study and use of topographic maps, geologic atlases, models and globes. Some time is to be devoted to field studies, map and section drawing, modeling and the use of cameras and photographs.

Physical Geography Laboratory, T., Th., 3-5. Professor CONDRA and Mr. VON ENGELN.

C. Field Course in Physical Geography. (*See synopsis of Excursions, pp. 36, 38.*) One afternoon each week and two Saturday all-day excursions are devoted to the study of physiographic phenomena in the field. In this field work a study is made of river valley forms, both young and mature ; waterfalls ; lakes ; and typical glacial deposits, including moraines, drumlins, kames, eskers, and outwash plains. Monday afternoon. If necessary two sections of the class will be formed ; the second section on Wednesday afternoon. Professor TARR, Supervisor WHITBECK, Professor CONDRA, and Mr. VON ENGELN.

D. Meteorology and Climatology. Lectures, laboratory work and field observations ; designed to meet the needs of teachers of physical geography ; offers suggestions as to subjects of

meteorological study that come within the scope of facilities afforded by public schools; where and how meteorological and climatological data may be obtained for school use; acquaints the student with the general circulation of the atmosphere; the development, progression and conditions that attend cyclones, hurricanes, tornadoes and special storms; the construction of weather maps and climatological charts; practical weather forecasting from weather maps and from local observations; use and care of meteorological instruments; general and special climatology and its relation to agriculture. Special attention is given to the practical application of the principles of meteorology as exemplified by the work of the United States Weather Bureau and other similar organizations.

Lectures, M., W., F., 12, *Geological Lecture Room*. Laboratory, W., 2-4:30. Section Director, U. S. Weather Bureau WILFORD M. WILSON.

E. Geography of North America. A summary study of the evolution, structure, relief and climate of the continent, and a fuller treatment of the physiographic regions, coast lines, resources and industries of the United States. The origin of the various land and water forms is explained, and especial attention is given to the control exercised by physiographic conditions upon life, cultural features, and the settlement and development of the various regions. Irrigation, drainage, forestation, dry farming and the introduction of drouth resistant crops, as methods of reclamation, are considered in their geographical relation. Much attention is given to supplementary reading and to the literature of the subject in general. The course is suited to students both of geography and history. It is fully illustrated with lantern slides, maps, folios and models.

Lectures, M., W., Th., F., 8, *Geological Lecture Room*. Professor CONDRA.

F. The Geography of Europe. A consideration of the physiographic features of Europe and their influence upon the history and industrial development of the several nations. The principal sub-topics are: (1) Physiography of the continent and its development; (2) climatic conditions; (3) natural resources; (4) influence of these various physiographic features upon race characteristics, early movements of people, development of navigation, modern national development, and location of leading cities, both in the past and present. Fully illustrated with lantern slides and maps. *Geological Lecture Room*, M., T., W., Th., 10. Professor TARR.

G. Geographical Influences and Relations. Lectures, illus-

trative lessons, and readings, designed to show the influence of climatic and physiographic conditions upon human activities. Method of teaching geographic relations will receive attention. Some of the topics treated are: the influence of climate, soil, coast line, mountains, valleys, plains, ocean currents, and navigable inland waters; geographic causes which determine the location and growth of cities, the selection of trade routes, the growth and migration of industrial centers; man's reaction upon his environment and his conquest of natural obstacles.

Physical Geography Laboratory, M., T., W., Th., F., II. Supervisor WHITBECK.

H. Elementary Earth Science. Five field trips and one indoor lesson. Matter and method will both receive consideration. Suitable for Grammar school teachers as well as for High and Normal school teachers. (See also *Nature Study*, p. 41.)

- (1) How the soil is made; its differences and qualities; samples.
- (2) The work of the streams.
- (3-4) The story of the rocks; two trips; collection of specimens.
- (5) The stories that the pebbles tell; collection of specimens.
- (6) Lessons from selected museum specimens.

Friday, 2-4:30. Supervisor WHITBECK.

Round Table Conference in Geography.

There will be several evening conferences for instructors and students in Geography, at which discussions of important general topics relating to geography will take place. Some topics discussed in previous years were *Nature and Scope of Geography*, *Principles Determining the Course of Study in Geography*, *Excursions and Laboratory Work in Geography*, *Sources of Geographic Knowledge*.

Attendance on this course is purely voluntary, but all members of the Geography courses are invited. Such free interchange of views among teachers and students is expected to throw much light on problems of teaching and on working methods.

General Lectures.

A course of weekly lectures on topics of general geographic interest will be given during the session by members of the Faculty. A list of these lectures will be announced early in the session.

SYNOPSIS OF EXCURSIONS OFFERED IN COURSE C.

Conducted by Prof. Tarr, Prof. Condra, Supervisor Whitbeck, and Mr. Von Engeln.

Although offered as regular work in Course C these excursions may

be attended by students in the other geography courses. The first six are required of all students registered in Course C. In addition they must attend either two of the all day excursions (7, 8, and 9), or one of the longer voluntary excursions (10 and 11.)

Afternoon Excursions.

(1) **Physiography of the Campus and Immediate Vicinity.** Young and mature valleys; difference in form; in other characteristics; evidence of glaciation; evidence of former higher level of lake; origin of Lake Cayuga; influence of the physiography on the settlement and industrial development of the region.

(2) **Excursion to Six Mile Creek,** to study the gorge and waterfalls; the evidence of interglacial gorges; effect of the terminal moraine on the valley form; the difference of the valley form in drift and in rock; the agents of weathering; influence of these facts on the questions of water supply and water power.

(3) **Excursion to Shore of Lake Cayuga,** to study wave form and movement; effects of wave erosion and transportation; the filling of lakes and the accompanying formation of strata; influence of stream action in lake filling; the resulting shore forms; nature and origin of joint planes; influence on man.

(4) **Excursion to Coy Glen,** to study the elevated deltas, a study of their form, and the evidence of former ice dams, which held up the waters of Lake Cayuga to higher levels; influence of these deltas in causing the Coy Glen gorge to be formed; a study of the gorge and its waterfalls; comparison between the lake history of the Cayuga valley and that of the Great Lakes.

(5) **Excursion to South Hill,** to study the broader physiographic features of the region; the maturely dissected plateau; the lake valley; the lake delta; and the influence of physiography on settlement and transportation routes.

(6) **Excursion to North Spencer,** to study the characteristics of a typical terminal moraine; its dissection by postglacial streams; its relation to the preglacial Cayuga Valley; overflow channel and outwash deposits; cultural adaptation to topography and streams.

Expense of Excursion 6 about \$1.00; others have no expense.

All-Day Excursions.

(7) **Excursion on Lake Cayuga by Steamer,** to study the deltas now forming in the lake; the Devonian strata of the lake shore; their fossil contents and variations in texture; the folding of the rocks; the joint planes; the Taughannock gorge and falls; the salt works; the Portland cement works. Expense about \$0.75.

(8) **Excursion to Enfield by wagon**, to study the preglacial valley : interglacial gorge ; postglacial gorge ; influence of hard layers on valley form ; influence of joint planes ; elevated deltas ; lateral moraine of Cayuga lake lobe of great ice sheet ; hanging valleys ; glacial erosion. Expense about \$1.00

(9) **Excursion to Freeville by wagon**, to study the upper Fall Creek valley ; its change from a young lower course to a mature upper course ; the extension of the terminal moraine across the valley ; characteristics of eskers, of kames, and of outwash plains ; the relation of these deposits to the moraine ; influence of glacial deposits on agriculture. On this excursion a visit to the George Junior Republic is usually made. Expense about \$1.00.

Longer Voluntary Excursions.

(10) **Excursion to Niagara.** The two plains ; the rapids ; the cataract ; the gorge ; the buried gorge ; the whirlpool ; the abandoned fall at Foster Flat ; the lower river ; the strata of the gorge ; the beaches of higher level of Lake Ontario ; the origin and history of Niagara ; the influence of Niagara on industry. Opportunity will be afforded to visit the immense power plant and some of the factories that have developed near the falls. (Friday and Saturday.)

(11) **Excursion to Watkins Glen.** A drive across the upland plateau, visiting the small Cayuta lake, and studying the moraine and its influence on the formation of the lake ; a study of Watkins and Havana Glens, among the most beautiful in the country ; a consideration of their cause. A comparison of Seneca and Cayuga lake valleys. Influence of these valleys on the industrial development of the region. Contrast with the upland. (Friday and Saturday.)

BOTANY.

The lecture rooms and laboratories are in the south-east wing of Sage College.

The courses here announced are especially designed to aid teachers in their work with elementary classes, and at the same time to furnish information and training for those not intending to teach. Field methods will be exemplified so far as practical in each of the courses, and in connection therewith valuable material may be secured for future use by the student. Short excursions will be substituted for the periods in the laboratory from time to time.

Three all-day excursions on Saturday, for purposes of special study, have been planned for students in all the courses.

I. Aquatic vegetation, Cayuga, N.Y., July 20. Expense, about 75c.

II. Peat-bog and marl pond vegetation, Junius, N. Y., July 27. Expense, about \$1.75.

III. Ravine and rock vegetation, Enfield, N. Y., August 3. Expense, about \$1.10.

Special announcements and outlines for study will be furnished for each of these excursions.

All students desiring University credit in any of the courses must participate in at least two of these excursions.

It is desirable that students taking courses D, E and F should have had some previous training in Botany. Lectures in the various courses will be illustrated with photographs, lantern slides, projection apparatus, and as far as possible with living material.

A. Elementary Physiology and General Morphology of Plants. A general elementary course in Botany. The aim of the earlier part of the work will be to familiarize the student with the general principles underlying the processes of absorption, nutrition, growth, etc., in plants, as well as with the methods of performing experiments to illustrate these phenomena. The latter part of the work will be devoted to a comparative study of the form and reproduction of representative species of all the great plant groups—algae, fungi, liverworts, mosses, ferns, gymnosperms and angiosperms. Emphasis will be placed on the homologies of the vegetative parts and organs of reproduction. Lectures, M., W., F., at 8. Laboratory, M., W., F., 9-12. Dr. DURAND. University credit, 3 hours.

B. Special Morphology of the Higher Plants. A comparative study of the vegetative and floral structures of the angiosperms. Types are selected representing the various groups of angiosperms. These will be studied from the point of view of their comparative form and their adaptation to special functions. Field studies will be undertaken for the purpose of illustrating and amplifying the work done in the laboratory. Excursions from time to time will be made to nearby localities. Drawings, notes and photographs will be utilized in connection with the course. Lectures, T., Th., at 8. Laboratory and Field work, T., Th., 9-12. Professor ROWLEE. University credit, two hours.

C. Organography and Identification of the Higher Plants. A study of the kinds of plants with special reference to structure, identification, habit and distribution of the species. Lectures, laboratory, and field work. Special training in the methods of studying a local flora, use of manuals and keys. Students may prepare an herbarium in addition to the regular work. There will be frequent short excursions to points of interest about Ithaca, and excursions I

and II will be required. The region about Ithaca is especially rich in plant forms, easy of access, and affords unusual opportunity for this work. Students having sufficient preparation may take some special group of plants for study. Lectures, F., 12; Laboratory, T., Th., F., 2-5. Dr. WIEGAND. University credit, 2 hours.

D. Taxonomy and Embryology of the Bryophytes and Ferns. Practice in the collection and identification of liverworts, mosses and ferns. The student will become familiar with the commoner genera and species, especially those usually employed in class work. Attention may also be given to certain phases of the embryology and development of typical plants of the same groups, or of the gymnosperms or angiosperms, if found desirable.

The region about Ithaca offers exceptional opportunities for the study of bryophytes and ferns. Part of the time will be spent in field work and excursions. In addition, students taking this course will be required to join excursions II and III.

Lectures, M., W., 12. Laboratory and field work, M., W., afternoons. Dr. DURAND. University credit, 2 hours.

E. Trees and Shrubs. Biological and Taxonomic Study of Trees. The subject will be approached from the point of view of a tree as an organism which has adapted itself to special conditions of nature. In studying the kinds of trees, their adaptation to special conditions will be kept constantly in view. Much of the work will be done in the field. The sylvan conditions in the immediate vicinity of the University afford a fine opportunity for acquiring familiarity with many kinds of trees growing under a variety of conditions. A brief study of the structure and development of wood will also be undertaken. Excursions II and III are required. Lectures, T., Th., at 12. Laboratory and Field Work, T., Th., afternoons. Professor ROWLEE. University credit, 2 hours.

F. Ecology of Plants. A study of the relation of plants to their environment, including the following topics:—adaptations, both external and internal, environmental factors, sequence and growth in plant societies, training in ecological methods. Lectures, laboratory and field work. Frequent short excursions will be made, and one all day trip on Saturday, in connection with Course C, to some point of special ecological interest. Special attention will be given to teachers of nature study who desire to obtain more information regarding the adaptations of plants. Students having sufficient preparation may elect some special problem in histological ecology. Excursions I and II will be required. Lectures, T., Th., 8; Laboratory, T., Th., 9-12. Dr. WIEGAND. University credit, 2 hours.

GENERAL ELEMENTARY BIOLOGY.

The New York Course in First-Year Biology. The objects of this course are (1) to consider the aims and limitations of the work in first-year biology ; (2) to suggest satisfactory methods of equipping laboratories and of obtaining material at small expense ; (3) to guide teachers in secondary schools in carrying on the laboratory experiments and observational work required in first-year biology ; and (4) to discuss the preparation of note books, laboratory drawings and other means of fixing in the mind of the student the facts and principles that should be acquired in this study. The course will be conducted, therefore, wholly to meet the needs of high school teachers of biology.

Since in most schools the biological instruction begins in September rather than in the Spring term, the topics of the New York State Syllabus will be treated in the order that seems most natural for such course. As far as time allows each teacher will be expected to do individual laboratory work on the various topics. In addition there will be general lectures that will show the relation to each other of the various parts of the course. Demonstrations will also be given of successful methods of keeping plants and animals alive in the classroom, of securing and preserving material, and of using this material in large classes and in museum exhibition. Opportunity will be given as far as possible for additional work to those teachers who are specially interested in any one of the three sub-divisions of the biological work (botany, zoology, or human physiology). Daily except Saturday. Lectures at 8, laboratory hours by appointment. *Stimson Hall.* Mr. PEABODY.

NATURE-STUDY.

Course A. The Nature-Study Idea. Lectures on the history and development of the nature study idea ; its educational significance and position under existing conditions ; its pedagogics ; logical and progressive courses for grades below the high school ; its materials and their use ; field trips : experimental work ; the literature of the subject and other general topics fundamental to the proper presentation of the subject. A part of the time assigned to this course will be given to lectures upon the selection and organization of material, the illustrations being drawn from plant life. Daily except Saturday 9, *Central Building of College of Agriculture.* Professor COULTER.

Course B. Plant Life in Nature-Study. Field and Laboratory work. The work will be of an extremely practical nature, the pur-

pose being to illustrate the proper management of the out-door work of pupils, as well as to familiarize the teacher with the more common plant forms which constitute so large a part of nature study material.

Some of the subjects of the course are: The school yard as a laboratory; practical studies of trees and shrubs; weeds; dominant plant families: fruits, native and cultivated; the propagation and migration of plants; plant societies; root and stem forms.

Special trips for the development of specific subjects will be arranged upon request. M., W., 2-4:30. Professor COULTER.

ENTOMOLOGY.

Most of the courses announced below are the equivalents of courses offered during the academic year, and for regular university students the requirements for admission and the nature of the work will be the same as during the regular school year. Students from other schools who wish to pass up courses B and C (or courses 4 and 5 in the announcement of courses for the academic year) must present drawings showing the work done. Credit for laboratory work will be allowed at the rate of one university hour for each thirty-six actual hours.

Courses B and C are parallel courses and will be adapted as far as possible to meet the individual needs of teachers or others who wish to do general elementary work. Regular students may elect these courses but, if they wish to take more advanced courses later, must then elect sufficient hours of courses 4 and 5 to complete the requirements for admission to advanced work.

The laboratories and lecture-room of the Entomological Department are located on the third floor of the central building of the New York State College of Agriculture.

A. Elementary Entomology. Lectures on the characteristics of the orders, sub-orders, and the more important families, and on the habits of representative species. M., W., F., 12. University credit one hour. *Entomological Lecture Room.* Assistant Professor MACGILLIVRAY.

B. Elementary Morphology of Insects. Laboratory work. An elementary course presenting the essentials of insect anatomy. Laboratory open M., W., F., 8-5. University credit two or more hours. Laboratory fee 50c for each university hour. *Laboratory of Insect Morphology.* Assistant Professor RILEY.

C. Elementary Systematic Entomology. Laboratory work. An elementary course giving practice in the determination of insects. Laboratory open T., Th., 8-5. Laboratory fee 50c for each Univer-

sity hour. *Laboratory Systematic Entomology*. Assistant Professor MACGILLIVRAY. University credit, one hour.

Open only to students who are taking at least two hours of course B.

D. **Entomotaxy**. Laboratory and field work. Methods of collecting insects and their preparation for the cabinet. M., 2:30-5, T., 8-11. *Laboratory Systematic Entomology*. Assistant Professor MACGILLIVRAY. University credit, one hour.

Open only to students who are taking course C.

E. **Advanced Systematic Entomology**. Laboratory work. Laboratory open T., Th., 8-5. Credit three University hours. Laboratory fee, \$6.00. *Laboratory Systematic Entomology*. Assistant Professor MACGILLIVRAY. University credit, two hours.

Open only to students who have taken courses 4 and 5 or courses B and C.

F. **Insect Histology**. Lecture course. Special attention paid to those features of histological structure which are peculiar to the arthropods. The lantern slides, charts and histological preparations with which the department is well equipped will be used freely for illustrative purposes. M., W., F., 8. Credit one University hour. *Entomological Lecture Room*. Assistant Professor RILEY.

Open for credit only to such students as have had courses 4 and 5, (as in University Register), or their equivalent.

G. **Insect Histology**. Laboratory course. This course is designed for students of general biology, as well as for those preparing for research in insect morphology. The work will be, as far as possible, adapted to meet the individual needs of the student. Laboratory open M., W., F., 8-5. University credit two or more hours. *Laboratory of Insect Morphology*. Assistant Professor RILEY.

Open only to students who have taken courses 4 and 5 (as in University Register) or their equivalent.

H. **Classification of the Coccidae**. A course designed to familiarize the student with the more injurious species of scale insects, the method of preparing specimens for study, and the systematic arrangement of the species. Lecture and laboratory work. Laboratory open daily ex. S., 8-5. University credit, five hours. Laboratory fee, \$5.50. *Laboratory Systematic Entomology*. Assistant Professor MACGILLIVRAY.

Open only to students who have taken courses 4 and 5 (as in University Register) or courses B and C.

I. **Research in Entomology**. Advanced work arranged with reference to needs and attainments of each student. For those wishing to carry on research in entomology during the regular academic

year especial opportunities are offered for the collection and preservation of material which it would be impossible to obtain except during the summer. Laboratory open daily ex. S., 8-5. Assistant Professors MACGILLIVRAY and RILEY.

J. Seminary. The work of an entomological seminary is carried on by the Jugatæ, an entomological club which meets for the discussion of current literature and of the results of investigations. Attendance at the meetings may be counted as laboratory work. T., 4-5.

VERTEBRATE ZOOLOGY.

A. Elementary Vertebrate Zoology. Lectures M., W., F., 9. *McGraw 5*; and three laboratory exercises by the class in sections. *McGraw 5*. First section M., W., F., 10-12:30; second section M., W., F., 2-4:30. Assistant Professor REED and Mr. SHELDON. The lectures will treat of the structure, development, systematic relationships and life-histories and habits of chordate animals. The laboratory periods will be devoted to the dissection and study of representative forms. Those to which special attention will be given are: the lancelet, lamprey, ray, shark, ganoid, bony fish, salamander, frog, turtle, bird, and mammal.

University credit, 3 hours. Laboratory fee \$6 00.

B. Ornithology. Lecture, S., 9, *McGraw 5*. Laboratory and field work to be arranged at the first lecture. Assistant Professor REED and Mr. WRIGHT. The lectures will treat of the various phases of bird life. As laboratory work, practice in classification with the aid of a manual, will be given. Two field excursions will be held each week under the direction of an instructor. For this work field or opera glasses are necessary in order to accomplish the best results.

University credit, 2 hours. Laboratory fee \$1.50.

PHYSIOLOGY.

A. General Human Physiology. Lecture-Conversations. This course is designed as a beginning course in Physiology, especially arranged for those who expect to teach Physiology in the secondary schools, and who wish to cover the entire subject.

Lee's American edition of Huxley's Physiology will be followed as a text book from which assignments will be made in advance. The topics assigned will be discussed, expanded and illustrated in the lecture periods. The lantern slides, charts, diagrams and physiological apparatus with which the department is well equipped will be used in illustration of the subject wherever possible. M., W., F., 10.

University credit, one hour. *Stimson Hall, Amphitheatre.* Assistant Professor KINGSBURY.

B. Anatomical Physiology. Laboratory work. This course will consist in the careful and systematic dissection, under direct supervision, of the cat's body, together with the heart and brain of the sheep, in illustration of the structure, location and functions of the organs of the human body. Comparison will be made at every step with the conditions in the human body.

Microscopic preparations will be made showing the finer structure of the organs as they are studied in the gross dissection.

Designed for those who lack the necessary preliminary knowledge of anatomy as a basis for Physiology. Course B may be taken with advantage in connection with course A. M., W., F., 11-1. University credit, one hour. *Stimson Hall, Room 34.* Assistant Professor KINGSBURY and Dr. DRESBACH.

C. Practical Physiology. This course has been arranged to meet the needs of teachers of physiology in the secondary schools, the aim being to assist the teacher in illustrating the subject by simple experiments which do not demand expensive apparatus. The course is quite flexible and can be adapted to the needs of each individual applicant. In addition to the laboratory work, there will be demonstrations, consultations, and text book work in order that fundamental facts may have as clear a presentation as is possible. This course may be taken in combination with courses A and B. T., Th., 10-1. Other additional hours may be arranged for. *Stimson Hall, Room 34.* Dr. DRESBACH.

D. Laboratory Work in Physiology. This course is designed to meet the needs of the general student of Physiology. The following subjects will be considered: (a) Chemistry of the Food Stuffs, (b) Physiology of Digestion and Nutrition, (c) Muscle and Nerve, (d) Circulation, (e) The Nervous System and Organs of Special Sense (Eye in particular). T., Th., 10-1. University credit one hour. *Stimson Hall, Room 34.* Dr. DRESBACH.

E. Experimental Physiology. Laboratory work. The course will cover (a) The Blood and Lymph, (b) Muscle and Nerve, (c) Heart and Circulation, (d) Respiration, (e) Vision. Any one division of the work may be taken or selected experiments performed. Six or more hours per week. Mornings, at hours to be arranged. University credit, varied according to amount of work. *Stimson Hall, Room 34.* Assistant Professor KINGSBURY and Dr. DRESBACH.

The work done in this course is more technical than that of course D and will be accepted, hour for hour, in place of the laboratory work required of students of medicine at Ithaca.

F. Advanced Physiology. Lecture course. Selected topics. The field of Physiology is so large that it cannot be satisfactorily covered in detail in a short time. Divisions of the subject will be chosen to suit as nearly as possible, the needs of those who take the course. The lectures will be illustrated by means of experiment and lantern slides. A general knowledge of the gross and fine structure of the body is presupposed in this course. The work may count, hour for hour, on the work in Physiology required of medical students at Ithaca. T., Th., 9. University credit 1 hour. *Stimson Hall, Amphitheatre.* Assistant Professor KINGSBURY.

The Department is well equipped with physiological apparatus for demonstration, illustration and experiment, such as ophthalmoscopes, perimeters, etc., kymographs and other recording apparatus; sphygmomanometers, sphygmographs, cardigraphs, and other heart and circulation apparatus; pneumographs, stethographs, etc., diagrams, lantern slides, etc.

MANUAL TRAINING.

General Statement. This course is designed especially for the needs of teachers of manual training in elementary, secondary and normal schools. Its aim is to unite the thorough technical training which is given in the regular summer course in the various branches of the mechanic arts with sound professional instruction in the science and art of education.

More and more is it recognized that the teacher of manual training needs a larger appreciation of the true educational significance of the subject. Not only does he need a thorough technical knowledge of the subject matter but also a better understanding of the pedagogical problems governing the best development.

Equipment.

The shops and drawing rooms of Sibley College are the largest and best equipped of any college in the country. They are being used by 1100 students and can accommodate 1500. They are at the disposal of the students of the Summer Session, who have the further advantage of seeing the regular instruction given to Sibley College students. They include a machine shop, a foundry, a blacksmith shop, and a wood working shop. The shops are exceptionally well supplied with machines and tools for the most complete instruction in the various subjects.

A portion of this equipment has been re-arranged and adapted for the special needs of teachers of manual training.

Admission. The courses are open to men and women, and will meet the needs of (a) Teachers of manual training who wish to perfect themselves in technical skill and professional study ; (b) Men or women who have the teaching experience or who possess technical ability and wish to qualify as teachers of manual training.

(c) Teachers of the State of New York who wish to qualify for the state examination in drawing and manual training as outlined in the syllabus for elementary schools, published by the New York State Education Department.

(d) School superintendents, principals of schools and teachers who wish to acquaint themselves with the methods and practices of manual training through the lectures and conferences.

Course of Study.

Includes in its scope :

1. A thorough training in the mechanic arts.
2. Instruction in mechanical drawing.
3. Class-room study of various methods and problems of manual training.

4. Lectures, discussions and reading in Principles of Education.

(Students electing manual training who have not had previous training in the various problems of education ought to elect Course A in Education.)

1. **Manual Training for the Lower Grades.** A course in basketry and weaving. Construction work in paper and cardboard, the elements of wood working. This course is presented to meet particularly the needs of the regular grade teacher.

2. **Wood Working for Elementary Schools.** A course employing a comprehensive set of bench tools adapted to the upper grades of the grammar schools, each model considered from the standpoint of fitness, form and decoration. Methods of presentation and execution. Mr. DEAN and Mr. BURKE.

3. **Wood Working for Secondary Schools.** A course which aims to prepare for the teaching of wood working in the secondary schools. It includes joinery, wood turning, pattern making and objects of furniture. Mr. BURKE.

4. **Forging for Secondary Schools.** A course which meets the needs of the teachers of forging in the secondary schools. It includes various kinds of welding, methods of tempering, dressing of tools and the designing and making of those projects which offer opportunity for simple decorative treatment. Mr. HEAD.

5. **Foundry Work for Secondary Schools.** A thorough course

in molding, casting, mixing of metals and the operation of cupola.
Mr. VANDERHOEF.

6. Machine Work for Secondary Schools. A strong technical course in filling and fitting with a comprehensive training upon the various tools of the thoroughly equipped machine shop. Students have the privilege of electing the lectures on the "Principles of Manufacture". Mr. WELLS.

7. Course in Mechanical Drawing for Elementary Schools. This course follows closely the syllabus of requirements of the New York State Department of Education and is intended to meet the needs of the grade teacher. Mr. WILLIAMS.

8. Course in Mechanical Drawing for Secondary Schools. This course is designed for either those who wish to teach mechanical drawing in secondary schools or who feel the need of a more complete knowledge of this subject in order to assist them in teaching shop work. Some of the topics covered are, use of instruments, lettering, orthographic and isometric projection, inking, tracing, conventions and working drawings. Students who are already familiar with these topics can elect a more advanced course. *Sibley 102.* Mr. WILLIAMS.

9. Lectures and Conferences. The lectures and conferences relate the training in practical work with the study of methods of presentation and its bearing upon the principles of education. This work is in charge of Mr. DEAN, assisted by members of the instructing staff. Daily except Saturday 11. *Goldwin Smith 156.*

The following topics are considered :

History and Growth of Manual Training.

Relation of Manual Training to the Aim and Means of Education.

Correlation of Manual Training with Other School Work.

Problems met in Organizing Manual Training, including Supervision, Courses of Study, Equipment, etc.

Adaptation of Manual Training Courses to the Needs of Small Towns and Rural Communities.

Use of Equipment for Evening School Work.

The University Library for reading and original work in this department is available to the students. It includes books, pamphlets, periodicals, photographs, and reports.

Daily Program.

8:00 to 11:00. Shop work under the supervision of Mr. DEAN and the instructor in charge of the shop.

11:00 to 1:00. Lectures and Conferences on Manual Training. Mr.

DEAN. Lectures, discussions and readings in Education A. Professor DEGARMO. See p. 13. (Omitted Saturdays.)

2:00 to 5:00. Shop or drawing room practice. (Omitted Saturdays.)

Further information as to the methods and scope of the departmental work may be obtained by addressing Professor KIMBALL.

MANUAL TRAINING FOR RURAL SCHOOLS.

The courses in the manual arts and mechanical drawing differ from the ordinary courses in the subjects in that the useful side of the knowledge and training is emphasized and is made as practical as possible. The carpentry is not merely manual training. It is *farm carpentry*. The course in blacksmithing deals with the practical repair work of the farm rather than being associated with the machine trade as is the ordinary course in forging. The mechanical drawing concerns itself not so much with the principles of mechanical drawing as related to the needs of machine design as to the planning of buildings and structures required on the farm.

Carpentry. The general aim is to teach students to care for and to use the common carpentry tools such as should be found on every farm. The students are required to make mortise joints, splices, and handles. They are taught to lay out rafters, stairways, frames, and such other problems as occur in farm building construction. Each student is required to file his own saw, sharpen his chisel, plane, etc.

Blacksmithing. The general aim is to teach students to do the ordinary repair work and to make the simple tools needed on the farm. Some of the topics considered are, the management of the forge and fire, the bending, shaping and welding of iron and steel, the making of links, rings, hooks, bolts, whiffle-tree irons, cold chisels and the shaping and tempering of steel tools.

Drawing. The general aim is to give to students a knowledge of mechanical drawing sufficient to make them capable of planning farm buildings such as dwellings, barns, poultry houses, etc., of designing convenient cupboards, cases and other interior fittings and estimating the cost of materials and construction.

SHOP-WORK AND DRAWING FOR ENGINEERING STUDENTS.

Under the direction of Professor Kimball. Office 205 Sibley.

A. Mechanical Drawing. An elementary course in Drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, conventions, working drawings, etc. 2-5 P M. daily except Saturday, *Sibley 201.* Mr. WILLIAMS.

B. Machine Sketching and Drawing. A more advanced course in mechanical drawing for those who have had the equivalent of Course A. Sketching of machine parts, machine drawing from sketches, empirical design. This course is an application of the work in Course A to such machine designing as can be done without a knowledge of mechanics. 2-5 daily except Saturday, *Sibley 201*. Mr. WILLIAMS.

C. Descriptive Geometry. See page 52.

Shop Work.

A. Pattern Making. Use of wood working tools ; elements of pattern making. Mr. BURKE.

B. Foundry Work. Moulding, casting, mixing of metals, operation of cupola, etc. Mr. VANDERHOEF.

C. Forge Work. Forging, welding, tool dressing, tempering, etc. Mr. HEAD.

D. Machine Work. Use of measuring tools ; hand and machine tools ; fitting and assembling. Each of the above courses daily except Saturday, 8-12, 1-5, and Saturday, 8-1. Mr. WELLS.

E. Principles of Manufacturing. Must be taken in connection with course D. Theory of measuring and other shop tools, elementary theory of manufacturing ; cost and time keeping systems, etc. Four lectures per week, M., T., W., Th., 11, *Sibley 105*, Mr. WELLS.

F. Manual Training. The scope of the above courses in shop work is the same as that of the corresponding courses given to the regular Sibley College students. They are intended for prospective engineering students or those who have already matriculated. In addition to these, special courses are offered in each shop, designed to meet the wants of manual training teachers, and given in close connection with the technical work of manual training. (See pp. 47, 48.) Teachers having special needs may have courses made up to suit their wants. At the same time it is greatly to their advantage to see the work as given to the regular engineering students. Blue prints of all exercises used can be had at a nominal price.

DRAWING AND PAINTING.

This work will comprise two courses :—**A. Representation ; A. Pure Design.** The aim of this course is to give, by theory and practice, a thorough understanding of those fundamental principles upon which the art of drawing and painting is based ; to enable the student not only to express himself adequately through the art of drawing and painting, but to have an intelligent understanding and use of its

terms. The work will consist of studio work, out-door sketching, daily individual criticism and informal lectures. Use will be made of the University Museum of Casts, Museum of Natural History, and Library. Weekly criticism of outside work will be given to those desiring it. Lists and necessary materials for each course may be obtained at the Cornell Co-op. Society and should be brought at the first session.

A. Representation. Daily except Sat., 8-11. *Franklin Hall.*
MR. FURLONG. This course deals with the truth of imitation, with the representation of objects as they appear to the normal eye as distinguished from the conventional and decorative, known as pure design. It is intended for art students, supervisors of drawing and teachers in the public schools. Special attention will be given to the needs of the grade teachers. The following subjects will be considered in theory and practice. Observation. Visual-mental thinking in tones, positions, measures and shapes. Drawing. The graphic expression of observation. Elements of Perspective. The laws of foreshortening and appearance. Drawing in Chiaroscuro. Consideration of Composition in Drawing and Painting. Design in Representation. Consideration of Methods of Teaching Drawing.

B. Pure Design. Daily except Saturday. *Franklin Hall, 8-11.*
MR. FURLONG. This course deals with the truth of imagination, the recording of ideas, and is intended for students and teachers desiring a practical working basis upon which to form some definite conception of the elements of pure design. It is intended to assist the student in obtaining a definite knowledge of terms of drawing, in an understanding of tone—(colors, intensities, neutralities, values)—relations in the analysis and synthesis of pure design, and inducing a finer visual discrimination and power of graphic expression in this subject. The topics to be considered in theory and practice are as follows:—Observation. Visual-mental thinking in tones, positions, measures and shapes. Differentiation of Pure Design and Representation. Consideration of the Elements of Pure Design,—tones, positions, measures and shapes in forms of balance, rhythm and harmony, in forms of order, and in forms of beauty. Tones. Quantities and qualities of light. Tone Classification and Definition. Tone-Relations. The Analytic and Synthetic Application of Tone-Relations to Pure Design.

MECHANICS OF ENGINEERING.

A. Mechanics. This course is the equivalent of the first term of course 20, College of Civil Engineering. Admission to this course is restricted to those already having a fair knowledge of the subject.

Students in Cornell University Engineering courses are not admitted to this course, unless they have taken the first term of course 20 in University classes during the regular University year and received a mark of at least 41. Those taking it, are not, in the main, permitted to take other work in the University. Problems form the basis of this work; a rapid review of parts of Church's "Mechanics of Engineering" is also involved. A study of the principles and applications to engineering of the mechanics of solids. Statics. Centers of gravity. Chains and cords. Dynamics of a material point. Impact. Virtual velocities. Centripetal and centrifugal forces. Moments of inertia of plane figures. Elementary principles of work and energy. Stresses and strains. Tension. Shearing. Compression. Torsion. Elementary problems in flexure. Lectures, recitations and problems, daily, except Saturday, 9, 10. *Lincoln Hall, 32.* Assistant Professor JOHANNSEN.

B. Mechanics. This course is the equivalent to the second term of course 20, College of Civil Engineering. The restrictions in this course are the same as in Mechanics A above. Advanced problems in flexure. Elastic curves. Safe loads. Continuous girders. Moments of inertia of solids. Dynamics of rigid bodies. General principles of work and energy. Power. Fly-wheels. Friction. Dynamometers. Belting. Graphic statics of mechanism. Elementary principles of hydraulics. Recitations, lectures, and problems, daily except Saturday, 10, 11. *Lincoln Hall 32.* Assistant Professor JOHANNSEN.

DESCRIPTIVE GEOMETRY.

A. Descriptive Geometry. This course is equivalent to courses 8 or 9, Register, page 398. A study of the representation of lines, planes, surfaces, and solids; and of their inter-relation; tangents, intersections, and developments; warped surfaces; shades and shadows; perspective. The subject is presented by lectures and notes, and the student is expected to establish the principles and methods presented by graphical solution of original problems, worked out in the drawing hours. Lectures, daily ex. S., 8. Drawing, daily ex. S., 9-12. *Lincoln Hall.* Mr. POND.

The work of this Course will be accepted for the Descriptive Geometry required in Sibley College.

